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ACADEMIC MEDICINE

JOURNAL OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

National Health Care and Academic Medicine

Accountability and Responsibility

Obligation to Increase Minority Enrollment

Variability of Direct Costs in Teaching Hospitals

Origin of the LCME

New Approach to Training Primary Care Physicians

Core Curriculum for International Health

Libraries' Handling of Reports of Invalid Science

Perceptions of Residents' Growth in Competence

Scholarly Productivity of Geriatrics Faculty

Predicting Students' First-year Performance

Influences on Students' Speciality Selections

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ROBERT G. PETERSDORF, M.D.

Not a Choice, an Obligation

Abstract—The author traces the gradual increase of educational opportunities for underrepresented minorities that began in the mid-1950s and indicates the role played by the Association of American Medical Colleges (AAMC) and individual medical schools in the 1960s and 1970s to increase minority enrollment in medical schools. Minority enrollment did grow dramatically for awhile, but since 1974 the nationwide percentage of minority students enrolling has remained about the same despite the rising percentage of minorities in the population (although some individual schools have recruited and graduated relatively large numbers of minority students). The author then emphasizes how crucial to the nation's future it is to reverse this trend and achieve equity of opportunity for minorities by enhancing their educational opportunities. He maintains that academic medical centers must become involved in identifying and assisting capable minority students well before they are potential applicants to medical school, thereby helping to enlarge the pool of academically qualified minority applicants rather than relying on more aggressive recruitment from the existing small applicant pool. Enlarging the minority applicant pool is the cornerstone of a new AAMC campaign nearly to double the number of underrepresented minority matriculants by the beginning of the next decade: *Project 3000 by 2000.* The short-term and long-term strategies of this campaign are described; it focuses on creating partnerships with high schools and undergraduate colleges and will be based in part on a variety of existing and successful efforts of this type being made by individual medical schools, private foundations, and the federal government. The author closes by asserting that to better educational opportunities for minorities is not a choice; it is an obligation. *Acad. Med.* 67(1992):73–79.

I invite you to indulge with me in a bit of reminiscing back to the 1950s, when I and perhaps many of you reading this article laid the foundations of our professional careers. In the postwar boom economy, our future possibilities seemed endless, limited only by our ambitions and talents. It is no wonder that I remember the 1950s as the "good old days." Obtaining what you wanted — whether it was a house or a college education — seemed to be within reach if you worked hard and played it smart — especially if you were white.

It is no secret that the 1950s were not such a favorable time for minority citizens. Oppressive laws and a long and continuous tradition of racial prejudice restricted educational opportunities for minorities. This began to change very slowly with the watershed Supreme Court decision of Brown v. Board of Education in 1954. In that era, the medical profession was not significantly different from the rest of society in the restrictions it placed on minorities.

A slightly different version of this article was presented on November 10, 1991, at the plenary session of the 102nd Annual Meeting of the Association of American Medical Colleges, in Washington, D.C.

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During the 1950s and 1960s, when 10% of the total population was black, only 2.2% of all physicians in the United States were black. The number would have been much smaller had it not been for the good work being done at Howard and Meharry, where, until the mid-1960s, three-fourths of all black doctors were educated. Mexican-Americans, mainland Puerto Ricans, and American Indians, who together made up about 3% of the U.S. population in the mid-1960s, constituted less than .2% of total medical school enrollment.

Paralleling what was happening in the rest of society, awareness of the injustice of unequal opportunity in medicine grew during the period of the civil rights movement in the early and mid-1960s. At that time, medical schools began actively to recruit underrepresented minority students—principally blacks—and lively discussions took place about what action the Association of American Medical Colleges (AAMC) should take. A task force was created and subsequently issued a report calling for an increase in first-year underrepresented minority enrollment to 1,800 by 1976. This number, the equivalent of 12% of the first-year class, corresponded to what was then believed to be the percentage of the four underrepresented minority groups in the population at large.

Tremendous progress was made in improving opportunities for minority students to study medicine during the early 1970s. This was largely attributable to the leadership of many people and institutions within the academic medicine community, supported by strong programmatic initiatives by the AAMC.

By 1974, first-year underrepresented minority student enrollment had risen to nearly 1,500, or 10% of the entering class (see Figure 1). Yet, despite the hard work of many in the academic medicine community, the enrollment goal of 12% underrepresented minority enrollment projected for 1976 was not met (Figure 2). In fact, today, 15 years later, the percentage of underrepresented minorities in the first-year class remains 10%.

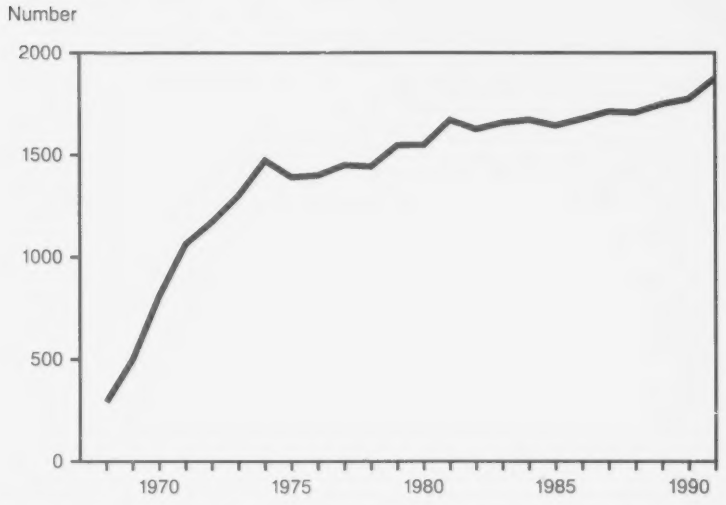

Figure 1. **Numbers of minorities enrolled as first-year medical students, 1968–1991.**

This plateau in enrollment is even more disturbing than it may at first appear because of continuing growth in the nation's underrepresented minority population. The chances for underrepresented minority students to be admitted to medical school have actually become more remote as their proportion of the total U.S. population continues to rise. Not only have we not made any progress toward our goal of providing equitable access to medical school for students from all segments of society, since the mid-1970s, we have been losing ground.

Current Programs

The current stagnation in enrollment has occurred despite a substantial commitment to minority recruitment

Figure 2. **Underrepresented minorities as a proportion of first-year enrollments, 1968–1991.**

by many schools. In 1991 the AAMC conducted a survey of minority-related programs, to which 101, or 80%, of the schools surveyed responded. Eighty percent of the responding schools had designated one individual as the chief minority affairs officer. Eighty-eight percent of the schools had developed and implemented some type of recruitment or enrichment program to increase the number of underrepresented minority students. The AAMC has found that both of these characteristics are positively related to minority enrollment.

While some schools may need to do very little to enroll relatively large numbers of very capable minority students, others invest a great deal of energy not only in recruiting from the existing applicant pool, but also in developing the skills of college and high school students — thereby expanding the size and improving the quality of the pool.

It is clear that many of our schools are working hard on this issue. In some cases these efforts have succeeded in producing large numbers of underrepresented minority graduates; in others, they have not. However, there are still some schools that have not given this issue a high priority, and their production of underrepresented minority graduates reflects this lack of commitment. It is fair to say that the schools that have been successful in producing relatively large numbers of underrepresented minority graduates have benefitted from strong commitment to minority recruitment by their leadership. The fact that underrepresented minority student enrollment has not substantially increased since 1974 sends us a clear message that something more — or something different — needs to be done.

Education and Racial Inequality in the 1990s

At this point, we need to address two central questions: First, what action can we take that would significantly increase the number of underrepresented minority medical students, and second, why is this so important?

The principal reason this issue is so important is, simply stated, the necessity for equity. In recent years, American society has become increasingly polarized by race. This dangerous trend has occurred at the same time that our country is becoming more heterogeneous in its racial and ethnic composition (see Table 1). In the 1950s nearly nine of every ten Americans were of white European descent. Today, one-fourth of us — and one-third of our children — are of African, Latin American, or Asian origin. Increases in the numbers of Mexican-Americans, blacks, American Indians, and mainland Puerto Ricans account for the vast majority of this increase in the underrepresented minority population. The rate of poverty for these groups, particularly for the children, is alarmingly high. Can we honestly say that these young people, whose success is critical for America's future, have the same chance to achieve in our society as most white children?

Today, unlike the pre-civil rights era, the formal laws limiting educational and professional opportunities for non-white Americans are gone, and overt displays of racial discrimination are much less common than in years past. Today, the major barrier to success is lack of education.

In our professional role as physicians and medical educators, it may seem that our principal contribution to alleviating the societal ills of poverty and lack of opportunity may lie in the provision of medical care for the indigent, a commitment undertaken by most teaching hospitals and many teaching physicians. I am convinced, however, that in addition to this, there is a role for academic medical centers in combatting the growing disparities between rich and poor. I believe we must also become involved in developing creative new ways to enhance educational opportunities for minority and economically disadvantaged youngsters in our communities.

In discussing these problems, it may seem that I have strayed from the issue of increasing underrepresented minority student enrollment — but I have not. We are in the unfortunate situation today that medical schools find themselves competing for the same small pool of academically qualified minority applicants. We cannot produce underrepresented minority medical students if there is an insufficient number who are applying to our schools, graduating from college, or even finishing high school with sufficient skills to enable them to survive a premedical course of study.

The Pipeline to Medical School

Increases in the enrollment of minority medical students of the magnitude needed can occur only with substantial growth in the size and enhancement in the quality of the applicant pool. This will not be accomplished without greater programmatic emphasis during the high school and early undergraduate college years. A

Table 1

The Changing Nation*

Group†	1990 No.	1990 %	% Change 1980–1990
White	199,686,070	80.3	+6.0
Black	29,986,060	12.1	+13.2
Mexican-American	13,495,938	5.4	+54.4
Puerto Rican	2,727,754	1.1	+35.4
Other Hispanic	5,767,247	2.3	+59.0
American Indian	1,959,234	0.8	+37.9
Asian/Pacific Islander	7,273,662	2.9	+107.8
Other	9,804,847	3.9	+45.1
Total U.S.	248,709,873	100	+9.8

*Source: U.S. Census

†Respondents of any group may have classified themselves as Hispanic.

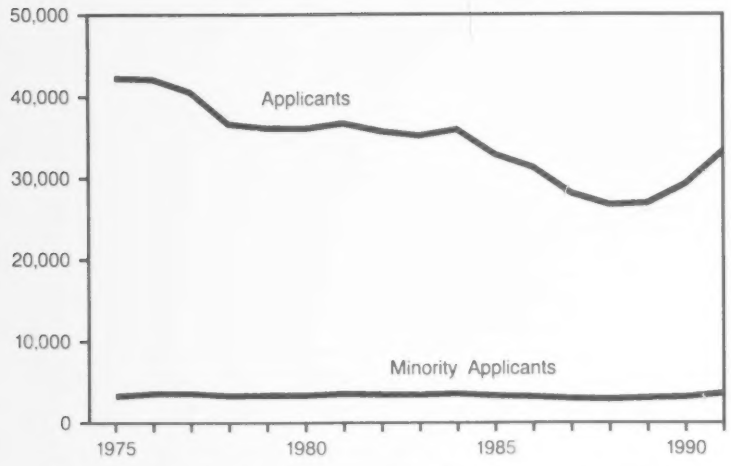

Figure 3. **Numbers of medical school applicants, 1975–1991.**

brief review of the data demonstrates that there are still steps that can be taken at every stage along the educational pipeline that will increase underrepresented minority student enrollment.

As examples, let us consider three stages of the pipeline to medical school: (1) applications made and acceptances offered; (2) the ratio of science graduates to medical school applicants; and (3) academic preparedness for science study.

Applications Made and Acceptances Offered

An examination of applicant trends shows that between 1975 and 1988, when the total number of applicants to medical school fell by 37%, the number of underrepresented minority applicants was relatively stable, and their percentage in the applicant pool rose from 8.7% to 9.4% (see Figure 3). The stability in the total number of minority applicants during this period is disappointing, given the substantial amount of work that had gone into recruiting such students and given their increase as a percentage of the total population of 22-year-olds.

In 1975, 41% of minority applicants were accepted, compared with 39% of all applicants. In 1990, 51% of minority applicants were accepted, compared with 59% of all applicants. In other words, in 1975, underrepresented minority applicants were slightly more likely to have been offered acceptances than were other applicants. Today, the situation has changed, and the acceptance rate for minorities, relative to all other applicants, has been declining. This decline in the rate of acceptance relative to that of other applicants has occurred even though the difference in Medical College Admission Test (MCAT) scores between minority and majority applicants has been steadily narrowing.

These data are noteworthy from two points of view. First, the overall lack of growth in the number of minority applicants and the fact that minority applications as a percentage of total applications have not reached the 1976 goal of 12% are discouraging. Second and even more discouraging is the falling acceptance rate for minorities relative to the majority, despite improvement in the academic credentials of minority applicants. These observations mandate that we take another look at the admission process.

Ratio of Science Graduates to Medical School Applicants

Although we encourage students with undergraduate studies in the arts and humanities to apply to medical school, three-fourths of all applicants and matriculants have earned bachelor's degrees in the sciences. Bearing this in mind, it is instructive to compare the number of black, Hispanic, and American Indian graduates in the sciences with the number of medical school applicants.

As Table 2 shows, medical schools are already receiving the lion's share of scientifically trained bachelor's-degree holders. This is especially true for minorities. That so many of the available minority science graduates apply to medical school is to no small degree testimony to the effectiveness of the recruitment programs that we administer. While we cannot afford to diminish our efforts to recruit minority college students to medical schools and to assist them when they are accepted, we must also recognize that recruitment and enrichment programs for college students have been the primary focus of our efforts for the past 20 years, and that the likelihood of increasing the *percentage* of such students that apply to medical school is probably limited. A more promising approach is to increase the

Table 2

The Number of College Science Degrees Compared with the Number of Medical School Applicants, 1987

Applicant Group	College Graduates with Science Degrees	Medical School Applicants	Ratio of Science Degrees to Applicants
White	48,438	20,328	2.4:1
Black	2,776	2,203	1.3:1
American Indian	221	123	1.8:1
Hispanic	1,682	1,175	1.4:1

absolute *number* of college students that apply to medical school.

Academic Preparedness of High School Students for Undergraduate Science Studies

If we are to make the kind of enrollment gains that are needed, new strategies that concentrate on improving the academic preparation of younger students must be implemented. This can be demonstrated by examining results of the National Assessment of Educational Progress (NAEP) survey of the science skills of 17-year-olds, and data from the Scholastic Aptitude Test (SAT), which is administered to most college-bound high school seniors.

There is no shortage of minority young people interested in careers in medicine. Nearly 5.5% of black college freshmen select medicine as their first career choice, compared with 3.2% of white freshmen. Unfortunately, very low college completion rates for blacks and Hispanics in general, and difficulty with introductory science courses, in particular, cause many of these high school and beginning college students to leak out of the medical school pipeline.

Why are so many minority students dropping out of the medical school pipeline? Undoubtedly there are many reasons, including dwindling financial aid and perhaps a less-than-hospitable climate for minorities on many college campuses. As for those students who remain in college but drop out of premedical studies, many are victimized by poorly taught introductory science courses. It is my strong view, however, that the primary cause of attrition from the pipeline is poor academic preparation prior to college.

The NAEP is a Department of Education survey of American school children's knowledge of various academic subjects, including science and mathematics, and of their literacy skills. This survey shows that black and Hispanic school children have been doing a better job in recent years of learning basic facts and rudimentary skills in all subjects. Nevertheless, there has been no improvement in the percentage of minority high school seniors who have mastered the more advanced skills that are prerequisites to success in college.

A look at the science skills of 17-year-olds is instructive. According to the NAEP's findings in 1986, only .05% of black 17-year-olds were able to integrate specialized scientific information for use in problem solving —a prerequisite skill for college science courses.

Given that there are approximately 560,000 black 17-year-olds in the United States, and that the NAEP's findings indicate that as recently as 1986 only .05% were prepared to study science in college, that works out to only 2,800 individuals, which is slightly higher than the current number of black applicants to medical school. A review of SAT data leads to the same conclusion regarding the degree to which the pipeline to medical school is already narrowed for minorities by the end of high school.

We must conclude from these bodies of data that substantial increases in minority student enrollment cannot be attained solely through more aggressive recruiting from the existing pool of premedical students.

Recognition of the Need for Early Intervention

This conclusion, of course, is not new. In 1978, after it had become clear that the rapid rise of underrepresented minority student enrollment begun in the late sixties had stalled, the AAMC convened a second Task Force on Minority Student Opportunities in Medicine. Its principal recommendation was to increase the size and the quality of the minority applicant pool by identifying highly motivated and capable minority students well in advance of medical school application. Ideally, this would mean reaching back as far as the primary grades. Practically, for medical schools the recruitment of such students would require that each medical school develop "feeder systems" with high schools and undergraduate colleges in its geographic sphere of influence. Through such feeder systems, the medical schools could assist neighboring institutions to improve students' academic preparedness, counseling, tutoring, and access to reliable career information.

Unfortunately, this recommendation of the 1978 Task Force was not widely implemented. I believe that its implementation is what is most needed today, and we have made it the cornerstone of a new AAMC campaign nearly to double the number of underrepresented minority matriculants by the beginning of the next decade. We have named this campaign *Project 3000 by 2000*, in recognition of its primary goal to increase the number of underrepresented minorities entering the first-year class from its current level of approximately 1,600 to 3,000 by the beginning of the next century. This numerical goal is simply an updating to current demographic realities of the AAMC's commitment, first made in 1970, to equitable representation in medical school for students from all segments of society.

Project 3000 by 2000

Project 3000 by 2000 is based on the premise that academic medical centers are an integral part of the communities they serve. In the field of education this interdependence with the community has resulted in medical schools' expectations that local undergraduate colleges and state school systems would provide sufficient numbers of students with the skills necessary for medical study from all segments of society. Unfortunately, these educational advantages have not been bestowed on many minorities.

Given the pervasive nature of the educational disadvantages minorities must overcome, medical schools cannot single-handedly compensate for the poor schooling received by many minority students. A few weeks of remedial laboratory and classroom work prior to the onset of medical school cannot compensate for years of inferior schooling. This is not to say that all minority students suffer from inferior preparation, or that the academic enrichment programs we ad-

minister are not worthwhile. Obviously, neither is the case, but, it is equally obvious that not enough qualified minority students apply to medical school, and that inadequate academic preparation during high school and college has prevented many minority young people from gaining admission. What can we—as a community—do to remedy this situation? That is what *Project 3000 by 2000* is all about.

Short-term Strategies

To reach its goal, *Project 3000 by 2000* will utilize both short- and long-term strategies. One short-term strategy is to intensify efforts to recruit minority students already in college by expanding cooperation between medical schools and undergraduate colleges to coordinate curriculum and develop innovative admission agreements.

One good example of cooperation between a medical school and undergraduate colleges is Boston University School of Medicine's early medical school selection program. In this program, 12 students each year from historically black colleges are provisionally admitted to the medical school at the end of the sophomore year. Students are at the medical school that summer and return to their home institutions for the junior year, after which they return to Boston. During the senior year, the students take courses at both the undergraduate campus and the medical school, earning dual credit for the medical school courses they complete with at least a "B" average. A "B" average leads to automatic admission to the medical school.

This program "decompresses" the preclinical years, increases the level of awareness and interest in medicine among students at participating undergraduate colleges, allows students gradually to become acclimated to the rigors of medical school, and eliminates a certain amount of redundancy in the baccalaureate and medical school curricula.

Another short-term strategy involves identifying groups of college students who are being lost from the pipeline. For example, almost 200 minority students take the MCAT each year and score well enough to be admitted to medical school but do not apply. Moreover, about 75 minority students are admitted each year but do not matriculate. These are obvious sources of students to be targeted immediately by medical school recruitment and financial aid officials.

Long-term Strategies

Long-term efforts involve the identification or creation of magnet health sciences high schools with substantial minority enrollments. These high schools would then be encouraged to form partnerships with colleges and medical schools to create an integrated educational pathway.

In virtually every community where there is a medical school, the academic medical center is one of the most respected, influential, and economically important institutions in the area. The academic medical center is also home to a large number of scientifically trained professionals. Under these circumstances, the stage is set for the development of potentially productive partnerships between the local schools and the academic medical center. Throughout America corporate organizations have initiated activities to help public education. Why should academic medical centers not do so as well?

I am not proposing that medical schools get into the business of running high schools or trying to dictate educational policies to local school officials. I am proposing that each academic medical center become an advocate in its own community for the implementation of a rigorous academic curriculum in at least one magnet high school serving a predominantly minority population.

The first program of this type was developed in 1971 by the Baylor College of Medicine. Although the program was founded by Baylor, primary responsibility for the administration of the school is now, quite properly, in the hands of the Houston school system. Over the years, nearly one of every 20 graduates of Houston's High School for the Health Professions have become physicians or are now in medical school. Three-fourths of the graduates have pursued science or health-related degrees in college. In the last several years, Baylor has joined with school systems in two other Texas cities to replicate this model.

The Josiah Macy Jr. Foundation has developed several successful high school health sciences programs and has placed them within existing public schools in both urban and rural locations. All of the Macy schools benefit to some degree from collaboration with an academic medical center. Like those from Houston's High School of the Health Professions, graduates from the Macy programs go on to study at highly selective universities and are awarded a significant amount of scholarship money.

With the support of the National Science Foundation and private philanthropy, a new organization called Ventures in Education is working to disseminate the Macy model around the country. Its goal is to enroll 100 high schools by the end of this decade.

Johns Hopkins, the Charles R. Drew University of Medicine and Science, the University of Southern California School of Medicine, and the University of Missouri—Kansas City School of Medicine also are involved in partnerships with magnet high school health science programs.

In every case, the primary responsibility for instruction lies with the local school system. The medical center contributes one or several of the following: (1) curriculum planning; (2) supplementary learning experiences at the medical school or teaching hospital; (3) summer and after-school jobs; (4) teacher training; (5) participation in admission agreements linking high school health sciences to undergraduate colleges and the colleges to the medical school; (6) "tracking" of the academic progress of participants in magnet programs; and (7) "adopting" them as their medical students of the future.

The involvement of medical center

personnel in these programs is very important to low-income youths, who may not know any doctors or other professionals in their communities. Over half of all medical students, both minority and majority, say that they decided that they wanted to become a doctor before graduating from high school. It is essential that we nourish this aspiration.

Still other medical schools, including the University of California at San Francisco, the University of Kentucky, and the University of Texas Health Science Center at San Antonio, work to improve the quality of science education for minority and majority students at schools systemwide, rather than at a specific school. Typically, medical school faculty work with elementary and secondary science teachers in summer laboratory internships or teacher in-service training, and are involved in curriculum development. Medical schools may also assist by donating surplus supplies for use in science instruction.

With so much going on already, why aren't we making more progress with minority enrollment? Part of the problem is that many of these efforts are relatively new, and it is too early to see the results. Second, better articulation among the various programs in which we are involved is needed in order to attain the optimum results. Third, many activities are still not sufficiently rigorous and demanding in view of the many prior years of educational deprivation. Fourth, more medical schools need to get involved because there is so much work that needs to be done.

Conclusion

Academic medical centers can do a better job of improving educational opportunities for minority students and increasing minority participation in medicine by working in partnership with local school systems and undergraduate colleges.

We cannot afford to be overwhelmed by the magnitude of this challenge — as daunting as it may seem. Medical schools, the federal government, and private foundations, including The Robert Wood Johnson Foundation, The Henry J. Kaiser Family Foundation, the Josiah Macy, Jr. Foundation, and the Commonwealth Fund, already are spending a great deal of money on programs to increase minority enrollment. It may be that more money is not primarily the winning ingredient. Rather, what we need is to broaden our horizons, to look beyond the "lone ranger" programs that we sometimes congratulate ourselves for running. We must become more analytical in the way in which we assess the educational needs of minority students at each stage of the educational continuum, and design our strategies accordingly. The establishment of partnerships with high schools and undergraduate colleges that share with us the common goal of improving educational and career opportunities for minorities is a strategy that we need to pursue more aggressively.

Our record of stagnant minority enrollment over the past 15 years demands that we renew our commitment to equality of opportunity for all who wish to pursue a medical education. All of us must become involved in this campaign. Providing young people from all racial and ethnic backgrounds with the opportunity to study medicine is not a choice. It is an obligation.

I am grateful to Dr. Timothy Ready, Dr. Herbert Nickens, and Mrs. Kathleen Turner for valuable assistance in the preparation of this article.

JAMES R. BOEX, M.B.A.

Factors Contributing to the Variability of Direct Costs for Graduate Medical Education in Teaching Hospitals

Abstract—Medicare's support of graduate medical education includes funds allocated to the direct costs of graduate medical education: housestaff stipends and benefits, faculty costs, and related educational costs such as classroom space. As reimbursed through the mechanism called the direct graduate medical education (DGME) pass-through, these direct costs have been reported to vary widely from one teaching hospital to another, with little explanation for this variation being available. Based on a national survey of 69 teaching hospitals—principally affiliated community teaching hospitals—the author suggests that a major cause for the variation in these costs might be found in their faculty-expenses component. It is further suggested that economies of scale may provide some clue as to the variability of these costs. The author also reports lower DGME costs for the survey sample than for the national sample, and suggests that the fact that community teaching hospital faculties include a significant volunteer component may account for some of these savings. *Acad. Med.* 67(1992):80–84.

As part of its overall goal of reducing health care expenditures, the federal government has targeted Medicare's support of graduate medical education (GME) as one area for special scrutiny and action.[1] Other third-party payers are also seeking to reduce or eliminate payments that support GME. Concern over the effects of such cutbacks on teaching hospitals' ability to provide appropriate graduate medical education opportunities has led educators, policymakers, and others to investigate both the direct and the indirect costs of GME.

The direct costs of GME include those that can be traced to educational cost centers; they are generally grouped into three areas: expenditures for housestaff stipends and benefits, faculty expenditures, and related educational expenses such as those for classroom space. These expenses are subsidized by Medicare through the mechanism of the direct graduate medical education (DGME) pass-through, subject to a number of restrictions. (The Consolidated Omnibus Budget Reconciliation Act of 1985—COBRA—among a number of restrictions and limitations, restructured the method of DGME reimbursement away from a strictly cost-based reimbursement method toward an institutional payment per full-time equivalent resident, based on 1984 costs.) Direct medical education expenses should not be confused with those that the Medicare Indirect Medical Education Adjustment (IME) helps offset, such as the clinical inefficiency of trainees and the higher intensity of care typically pro-

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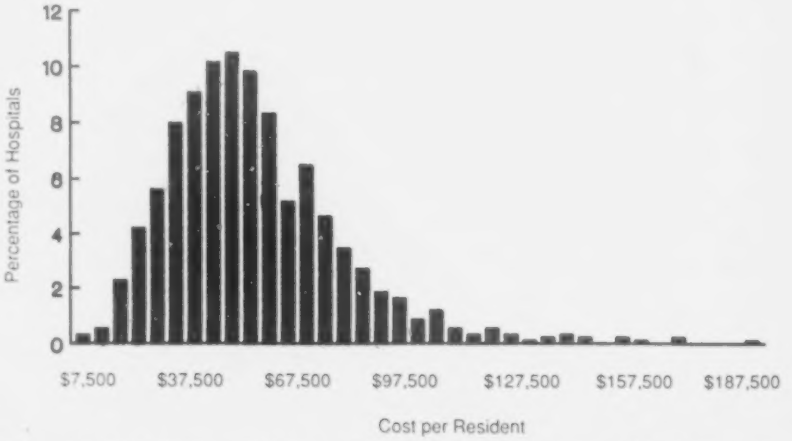

Figure 1. **Distribution of U.S. teaching hospitals' costs per resident. (Source: Council on Graduate Medical Education (DHHS, HRSA), first report, July 1988, based upon C.B.O. tabulations of 1984 Medicare cost reports.)**

vided by teaching hospitals. This paper deals with those activities reported and supported through the mechanism of the DGME. Medicare's expenditures for the DGME exceed $1 billion annually.[2]

In 1988, the staff of the Prospective Payment Assessment Commission (ProPAC) published in the first report of the Council on Graduate Medical Education (COGME) an analysis of data from 1984 Medicare cost reports, which showed that, on a per-resident basis, the direct costs of GME at the nation's teaching hospitals ranged from $7,500 to nearly $200,000, with a mean of $53,500.[3] The distribution of these per-resident costs is shown in Figure 1.

There is agreement that the very lowest per-resident expenditures reported probably occur because of the presence of funds that partially offset otherwise higher expenditures (such as funds that might be made available by state grants for primary care residency training), but beyond this, the causes for this wide range of costs have been widely speculated upon, with little specific analysis being published to date.

The AHME Survey

Concern for the policy implications of such a range led the author to undertake a survey of members of the Association for Hospital Medical Education (AHME), a national organization that includes over 200 teaching hospitals. The survey addressed issues related to graduate medical education activities and expenditures at each institution. This group was chosen because relevant data on the type of hospital that makes up the largest part of its membership — major teaching hospitals not owned or operated by universities — were found not to have been widely collected or analyzed. While the staff of the Council of Teaching Hospitals of the Association of American Medical Colleges (COTH/AAMC) have regularly published excellent data on teaching hospitals, these data usually focus either on the approximately 120 university hospitals on COTH's "Academic Medical Center" list, or on the total COTH membership, of which the academic medical centers constitute a significant percentage.

Table 1

Comparisons between AHME and COTH Members' Expenditures for, and Sources of, Residents' Stipends and Benefits, 1989–90

Postgraduate Year	Dollar Amounts of Stipends for First-, Second-, and Third-year Residents' Nationwide		
	AHME Mean*	COTH Mean†	% Difference
One	24,300	24,649	1.4
Two	25,870	26,222	1.3
Three	27,195	27,659	1.7

Benefit	Percentages of Hospitals Providing Each of Seven Benefits	
	AHME Hospitals*	COTH Hospitals†
Hospitalization	100	100
Dental services	90	77
Prescription drugs	90	90
Life insurance without charge	77	74
Disability insurance without charge	72	64
Psychiatric support without charge	82	58
Meals without charge when working or on call	94	92

Source	Percentages of Funding for Residents' Expenses, from Each of Seven Sources		
	AHME Members*	COTH Major Affiliates†	COTH Limited Affiliates†
Patient-care revenues	90.4	82.1	93.7
State and/or municipal funds earmarked for GME	4.9	9.3	3.3
VA appropriations	0.0	0.6	0.8
Physician fee revenues	1.0	0.8	0.1
Medical school funds	0.0	1.2	0.1
NIH and/or other federal funds	0.8	0.6	0.2
Other (endowments, grants, etc.)	2.9	5.4	1.7

*Data are from the 69 Association for Hospital Medical Education hospitals that responded to the survey reported in this article.

†Data are from the *Council of Teaching Hospitals' Survey of Housestaff Stipend, Benefits, and Funding*. Washington, D.C.: Association of American Medical Colleges, 1989.

Hospitals Sampled

Sixty-nine hospitals, or 33% of the organization's membership, returned usable surveys. Such a sample represents — in terms of the available literature on GME costs — a representative and characteristic subject for study. (The representative nature of the responding hospitals is also shown by certain of their characteristics, as is explained below.) The 69 hospitals that responded are located in 19 different states distributed across the country and are representative of the national AHME membership. The data gathered were for the 1989 fiscal year.

Sampled Hospitals' Characteristics

The mean bed size of the responding institutions was 474, with an average enrollment of 91 full-time-equivalent residents. The typical respondent sponsored five residency programs, most frequently in internal medicine, general surgery, family practice, obstetrics-gynecology, and transitional

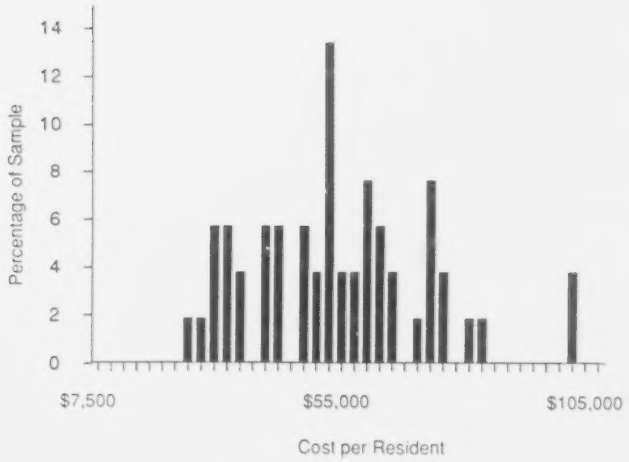

Figure 2. **Direct Graduate Medical Education costs of Association for Hospital Medical Education survey hospitals, fiscal year 1989.**

year (in descending order of frequency), and participated in three more. Eight percent of the respondents were institutions included on COTH's academic medical center list; an additional 66% were listed as major affiliates of at least one medical school. Only 3% reported no medical school affiliation. Fifty-eight percent reported membership in COTH.

Many characteristics of the responding institutions were found to be consistent with the characteristics of teaching hospitals described in reports of previous studies. This is important in considering the applicability of the findings described in this report. Two major areas where the sample data were compatible with earlier findings, for example, were in the areas of sources of funds for, and levels of, housestaff stipends and benefits.

In the area of housestaff stipend and benefit levels, regularly published COTH data provide an excellent source of comparison for data gathered from the sample. As shown in Table 1, the findings from the survey are consistent with COTH data concerning its membership,[3] showing little interinstitutional variability among stipend levels for each postgraduate year.

In the case of funding sources, COTH data are available based on member hospitals' medical school affiliation status, so a more direct comparison is available. As shown in Table 1, comparisons with COTH data[4] once again provide confirmation that findings from the sample can be considered characteristic of the population of community teaching hospitals.

Findings of Interest

The findings of interest are in three general areas: how the DGME per-resident costs in the survey compared with national data, how the components of the DGME costs varied among institutions, and how the size and nature of an institution's educational effort might affect its per-resident DGME costs.

DGME Costs per Resident

Updates of the ProPAC data from the 1984 base year suggest that FY89 direct graduate medical education costs would be in excess of $60,000 per resident. In confirmation of this supposition, the AAMC has calculated an FY89 per-resident mean DGME cost of $63,450 for its approximately 120 academic medical centers.[5] In comparison with this, the mean FY89 per-resident expenditure reported in this survey was lower, at $52,100, and the range was considerably narrower, $20,000–$100,000. The distribution of these costs is shown in Figure 2. The causes of the apparent lower costs are worthy of investigation, particularly in times of fiscal restraint.

Components of DGME Costs

Analysis of the three major components of the direct costs of graduate medical education at the responding hospitals — housestaff expenses, faculty expenses, and other educational expenses — showed a mean relationship among these variables of 55% housestaff-related, 26% faculty-related, and 19% other-related. However, when the respondents were divided into those with DGME expenses above and below the mean, it was found that faculty-related expenses constituted a higher proportion of total costs at the hospitals with higher DGME costs. Those hospitals that had lower costs reported expending larger percentages of their totals on housestaff stipends and benefits. The sample was then restricted to those 20 respondents that had the ten highest and the ten lowest per-resident DGME costs. As shown in Figure 3, the results of this analysis suggest strongly that further investigation of faculty-related expenses as the component of the DGME costs most responsible for the wide range of per-resident expenses might be fruitful.

Potential for Economies of Scale

Economists employ a concept called "returns to scale" that considers how changes in the levels of inputs in a production process affect the levels of outputs. When costs are also considered, and when through maximizing efficiencies and other steps outputs can be increased without proportional increases in the costs of inputs, then what economists call "economies of scale" are being achieved.[6] Applied to

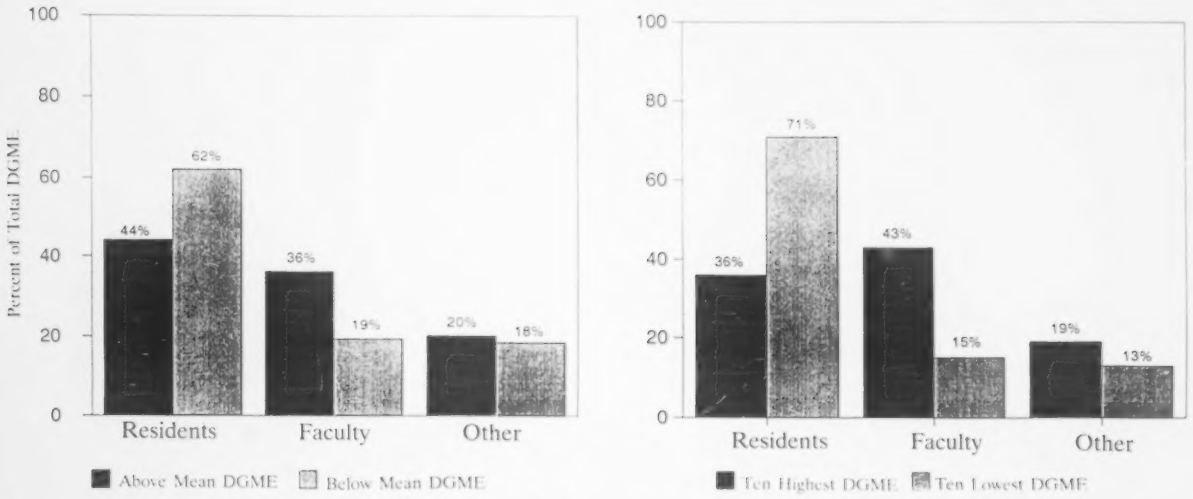

Figure 3. **Variations in the components of Direct Graduate Medical Education (DGME) expenses. The left figure shows variations at 69 Association for Hospital Medical Education (AHME) hospitals with costs above and below the mean on a per-resident basis. The right figure shows variations at 20 AHME hospitals, ten of which had the highest costs per resident, and ten of which had the lowest such costs.**

teaching hospitals, a simplified version of this analysis might suggest that institutions with more and larger training programs would have lower per-resident costs than those with fewer or smaller programs. This is, in fact, what the findings from this study suggest. Those hospitals that had lower DGME per-resident expenses characteristically had more beds, more sponsored programs, and more FTE residents than did institutions that had higher DGME costs. This dynamic was further demonstrated when the 20 institutions with the highest and the lowest DGME costs were examined and compared (Table 2).

These conclusions are borne out by multiple regression analysis, which showed that nearly 35% of the variance in the per-resident DGME costs of the institutions making up the sample could be accounted for by a combination of the faculty-related share of total DGME expenses and the size of the educational endeavor (using number of FTE residents as a proxy for that characteristic).

Conclusions and Recommendations

The wide and unexplained variability in Medicare's per-resident costs for DGME discovered by the staff at ProPAC presents a problem to policymakers and scholars of clinical medical education. While some of the variance is certainly due to institutional differences in accounting assumptions, and some additional variation is due to differing interpretations of Health Care Financing Administration (HCFA) guidelines by the several fiscal intermediaries, a large segment of the total variance remains to be explained.

Table 2

A Comparison of Selected Characteristics between the Ten Most and the Ten Least Costly Hospitals for Per-resident DGME Expenses, 1989–90

Characteristic	Hospitals with Most DGME Expenses	Hospitals with Least DGME Expenses
No. sponsored programs	2.2	5.2
No. FTE residents (DME)	44	112
Resident-to-bed ratio (IME)	.104	.212
No. FTE fellows	7.6	17
Portion of hospital budget spent on housestaff stipends and benefits	1.25%	2.7%
Portion of GME total costs for housestaff expenses	36%	71%
Portion of GME total costs for faculty expenses	43%	15%
Portion of GME total costs for other expenses	19%	13%
Bed size	380	462
PGY-1 stipend	$23,425	$23,820

The data presented in this paper suggest that much of the cost variability may be found in the different ways institutions bill Medicare for the faculty components of their direct costs of GME. This in turn suggests a reason the hospitals in this study reported lower overall per-resident costs than the national data would suggest: lower faculty expenses could reasonably be expected to be found in institutions where the faculty effort is largely volunteer, a feature characteristic of affiliated community teaching hospitals,[7,8] which make up the largest group in this sample.

Further, it appears that economies of scale may also be a factor explaining some of the differences in DGME expenditures among institutions.

These factors suggest two approaches to additional research: first, more detailed investigation of the faculty-related billing practices of institutions that have per-resident costs both above and below the mean—with particular emphasis on the role of volunteer faculty in affiliated hospitals—should be undertaken. Recently published data by Jolly and colleagues[9] on community-based medical schools may be helpful in this analysis. Second, the relationship between fixed and variable costs in GME should be studied, as they may relate to the achievement of economies of scale. Questions to be answered might include what "critical mass" of trainees and/or programs might be necessary to offset fixed costs, once these have been identified. It is suspected that this could most effectively be undertaken on a specialty-specific basis, since the mix of fixed and variable costs of residencies will likely differ from one specialty to another (i.e., internal medical versus surgery).

Such an approach could well yield information important to educators and decision makers at the level of the individual hospital as well as at the state and federal levels as efforts to understand and control the costs of medical education and care continue.

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Medical School Libraries' Handling of Articles That Report Invalid Science

MARK P. PFEIFER, M.D., and GWENDOLYN L. SNODGRASS, M.L.S.

Abstract—In 1989–90 the authors conducted a nationwide study to examine how academic medical libraries handled articles that report invalid science and to determine the effectiveness of any policies implemented to limit the use of such articles. Ninety-five of the 127 medical school libraries the authors surveyed completed questionnaires analyzing policy and attitude issues. Eighty-four of these libraries manually reviewed the available copies they held of ten retracted articles. Of the 811 copies of the retracted, invalid articles reviewed, 742 (91.5%) were not tagged as being invalid. Seventy-nine percent of the libraries had tagged none of the retracted studies and only 16% had policies for managing articles that report invalid science. Academic librarians reflected a common attitude against perceived library censorship and emphasized the user's role in assuring validity. The nation's medical libraries, at least in part by intent, do not commonly identify or have policies to handle the invalid articles they hold. The authors conclude that biomedical researchers, clinicians, and teachers should not assume published studies held in libraries are inherently valid. The lack of stated policy and the disparate assumptions about the role libraries play in this area may perpetuate the use of invalid articles. *Acad. Med.* 67(1992):109–113.

In the last 15 years numerous incidents of both misconduct and honest error have occurred in scientific research. These events have created a significant body of invalid scientific literature, now approximately 100 retracted studies.[1]

While the causes of invalid research, especially of that originating from scientific misconduct, have been widely debated, little is known about how science handles its inaccuracies once published. Considering the thousands of studies published each year, the approximately 100 known retracted works may seem inconsequential. However, through generations of citations in subsequent manuscripts, textbooks, and grant proposals, and through teaching, the spread of invalid information can be greatly magnified. Our prior work[2] revealed that retracted scientific studies continue to be frequently used in ongoing work, with 82 studies being cited 733 times after retraction, a reduction in citation of only about one-third.

Medical school libraries serve as central repositories of scientific literature and are therefore deeply involved in the process of information exchange. Little is known about how academic libraries handle invalid studies, and no national policy for their management exists. Clinicians, researchers, and students may assume published science held in well-managed libraries to be valid unless indicated otherwise. Because libraries have a potentially significant impact on the use of invalid research and thus on future research, teaching, and patient care, we conducted a national study examining the handling of retracted medical literature by academic medical libraries.

Method

The 127 libraries of all the medical schools listed in the *AAMC Directory of American Medical Education*,[3] excluding our own school (the University of Louisville School of Medicine) and those outside the 50 United States, were included in this 1989–90 study.

There were two major components to the study: (1) a direct evaluation of the status of currently held invalid research studies and (2) a survey of medical school libraries' attitudes, knowledge, and policies regarding articles that report invalid science.

For the first component we asked each library to manually examine ten published studies in the condition in which they were held in their libraries, noting whether they were in any way identified as being invalid for the library patron. This identification, also known in library jargon as "tipping in," could be any form of physical notice that tagged the article. The ten articles, published from 1975 to 1986, reported bioscience research results that were later found to be invalid and were followed by published retractions.[4–13] They were selected from a growing pool of 98 retracted studies identified by on-line searches and manual review of editorials and reports on scientific pub-

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lishing. The ten articles used in this study were not randomly chosen but instead were selected for specific attributes that might influence their handling by libraries. Three were from the high-profile general-science journals *Nature*,[11] *Science*,[8] and *The New England Journal of Medicine*,[10] while others were from journals with lower *impact factors* (ratios of citations received and articles published).[14] Five of the works[7-9,12,13] were the only papers retracted by their authors, while the other five were parts of series of retractions. Five[5,6,10-12] were retracted because of apparent scientific misconduct, three[8,9,13] because of apparent pure error, and two[4,7] for reasons that are unclear. Three[5,6,10] were from widely publicized incidents of fraud by well-known scientists, whereas other works were by authors who were less well known. Two[11,13] were from non-U.S. authors. Five[4,6,10,12,13] were retracted in relatively unnoticeable letters to the editor, while the other five had separate retraction notices. One work[10] was noted only as "questionable" in a letter to the original publishing journal[15] but was listed as a retraction in another journal.[16]

The second component of the study was a survey with open-ended and multiple-choice questions evaluating the libraries' current attitudes, policies, and awareness regarding invalid literature. This survey asked medical school library directors to characterize their libraries' formal and informal policies for handling retracted literature. We analyzed academic librarians' levels of awareness of the issues surrounding scientific fraud and asked them to describe how frequently they discussed related issues at staff meetings. We also asked how often library users requested information regarding retractions. Finally, the survey asked librarians to estimate the number of hours they devoted each week to policy or procedure concerning retracted literature, and we asked for their open-ended comments and concerns about this issue.

Results

Ninety-five of the 127 medical school libraries surveyed (75%) participated in the study. Of these, 84 completed the questionnaire and manually reviewed their copies of the ten retracted articles, while 11 completed the questionnaire only. The responding libraries had a wide geographic range, covering 42 of the 44 states with medical school libraries (95%) and the District of Columbia.

Twenty-nine of the 840 copies of the ten retracted articles (3%) were not available at the time of review. Of the remaining 811, only 69 (8.5%) were tagged in any way as being invalid, leaving 742 (91.5%) unmarked. None were reviewed on microfilm.

As shown in Table 1, the percentages of the libraries tagging the ten articles as invalid were consistently low, ranging from 4.8% of the libraries for an article in *The New England Journal of Medicine*[10] to 15.7% for an article published in *Annals of Internal Medicine*.[6]

A total of 66 medical school libraries (79% of those that performed manual reviews) had tagged none of the ten selected articles, while only one library had tagged all ten. Seventy-eight (93%) had tagged five or fewer of the invalid works.

The questionnaire results revealed that only three libraries (3%) had formal policies regarding invalid literature, and another 12 (13%) had infor-

Table 1

Numbers and Percentages of Copies of Ten Invalid Studies Marked as Invalid and Left Unmarked by 84 Medical School Libraries, 1989–90*

First Author and Journal	Copies of Articles Marked		Copies of Articles Unmarked	
	No.	%	No.	%
Milanese,[4] *J. Exp. Med.* (1986)	8	9.8	74	90.2
Slutsky,[5] *J. Am. Coll. Cardiol.* (1984)	8	10.4	69	89.6
Darsee,[6] *Ann. Intern. Med.* (1980)	13	15.7	70	84.3
Kark,[7] *Ann. Neurol.* (1980)	6	7.3	76	92.7
Muschel,[8] *Science* (1983)	6	7.4	75	92.6
Salditt-Georgieff,[9] *Proc. Natl. Acad. Sci.* (1983)	8	10.1	71	89.9
Soman,[10] *N. Engl. J. Med.* (1978)	4	4.8	80	95.2
Gullis,[11] *Nature* (1975)	6	7.5	74	92.5
Glueck,[12] *Pediatrics* (1986)	5	6.0	78	94.0
Danks,[13] *Am. J. Hum. Genet.* (1983)	5	6.3	75	93.7
Total	69	8.5	742	91.5

*As part of a nationwide study examining how medical school libraries handled articles that report invalid science, 127 libraries were asked to review manually the available copies they held of ten retracted, invalid articles in order to determine whether they had marked their copies as invalid. Eighty-four of the libraries performed the manual reviews, covering a total of 811 copies. In the table above, the sum of all copies (marked and unmarked) of a given article may be less than 84 because not all libraries had copies available for manual review. The superscript numbers next to the first authors' names refer to the reference citations listed at the end of this report.

mal policies. Six (6%) maintained lists of retracted works in their reference areas. Forty-six of the responding libraries (51%) had never discussed the handling of retractions of medical literature at staff meetings. (All percentages in this paragraph and the following paragraphs in this section, unless otherwise noted, are based on the numbers of responses to individual questions — (each question received 90 or more responses.)

Thirteen libraries (14%) reported attempting to physically tag all invalid works. Manual review revealed that these libraries had actually tagged 60 of the 125 copies of articles (48%) they evaluated. In addition, nine of the 676 copies (1%) reviewed by libraries that did not attempt to tag retracted works were actually tagged.

Nineteen of the responding libraries (21%) described themselves as "highly aware" of invalid scientific literature and scientific fraud. These libraries had tagged 45 of the 177 articles they reviewed (25%). This tagging rate exceeded by more than six times that of libraries describing themselves to some degree as less aware.

Libraries that had formal or informal policies regarding the handling of invalid scientific literature had tagged 36% and 32% of their reviewed articles, respectively. These schools, making up only 18% of the group completing the manual review, accounted for 70% of the tagged articles in the cohort. The schools without any type of policy had tagged 3% of their reviewed articles.

Sixty-six academic libraries reported their time spent weekly in policy or procedure regarding invalid scientific literature. Of these, 53 (80%) reported no time spent. For all 66 libraries, the amounts of time spent per week averaged 14 minutes, while for the 13 libraries spending some time, the average was 70 minutes per week.

Medical school library patrons rarely requested information about the validity of research publications from libraries, with 69 of the libraries (75%) reporting no such request and another 19 (21%) reporting one or two requests in the preceding six months.

Discussion and Recommendations

An overwhelming majority (91%) of the copies of the invalid scientific articles we studied had not been marked as invalid by our nation's academic medical libraries. Few libraries had tagged significant numbers of retracted articles, with over three-fourths having tagged none of the studies reviewed and only one library having tagged all ten. In addition, few libraries had formal or informal policies regarding invalid literature, and few had attempted to tag or maintain lists of retracted studies. Over 80% of the libraries spent no time each week on policies or procedures related to retracted works.

Clearly, our medical school libraries do not routinely identify retracted, invalid studies and have not developed programs to address this issue. However, assumptions aside, this apparent lack of effort is very likely due not simply to oversight or neglect. Many professionals in library science do not believe libraries can or should judge the integrity or validity of their holdings. The exact roles of "quality filtering" and censorship have been hotly debated at national library and medical publishing meetings. In our study, numerous responding library directors supported a hands-off approach, reflected by the following comment from one director: "The library must not be seen as taking responsibility for the accuracy of the content of library holdings." Another recurring theme in the comments we received was the strong feeling that the users of information have total responsibility for assuring the accuracy of data: "It is the responsibility of the individual using the information to make an informed and intelligent decision. It is not the responsibility of the librarians to predigest data." Even the National Library of Medicine has expressed its concerns that in protecting users from misinformation some possible approaches would place it in "the inappropriate role of censor."[17]

Over the last several years the National Library of Medicine has developed several electronic practices involving MEDLINE to report inaccuracies of previously published works. In 1987, the MEDLINE database[17] began retroactively tagging articles that had been retracted, although some have been omitted from this process of electronic tagging because they have not met specific criteria. A "Comments" tag[18] was added in 1989 to notify MEDLINE users of important follow-up published notices about the original article, including some questioning study accuracy but not qualifying as full retractions. However, no policy on physically identifying the actual articles as invalid has been advanced by either the National Library of Medicine or the Medical Library Association.

Many responding librarians in our study commented that intervention at the local level is unnecessary because all such information is on MEDLINE. However, their position assumes that researchers and clinicians exclusively use MEDLINE to find published studies rather than also using bibliographies, reference lists, textbooks, other indexes, or references from colleagues.

A problem that would remain even if invalid articles were marked systematically at the local level is that users would need to check MEDLINE or their local libraries periodically to determine whether articles they were using had been tagged after their first location of them. Such periodic review by users is unlikely to be a common practice. Thus, interventions at the local library level might be ineffective rather than unnecessary, as some librarians have claimed. A factor further contributing to this possible ineffectiveness is the large number of journals held outside formal libraries in personal, laboratory, and hospital collections.

The results of the present study clearly indicate that the onus for determining the validity of a study currently lies with the user of medical literature. Researchers, clinicians,

and teachers are generally familiar with the critical review necessary before accepting any study's conclusions and implications. Students may be less aware. Regardless, even if the evaluation of study design and method is common practice by the readers of scientific research, the determination of the integrity of published results is not. With three-fourths of the libraries reporting no request for information on retractions from users in the preceding six months, users must be determining integrity and validity on their own, or assuming the studies they use report valid results, or globally unaware that published results have even the potential to be inaccurate. Thus, a gap may exist between users approaching libraries as repositories of honest results and libraries considering themselves archivists of both good and bad research.

It is possible the academic community's own attitudes in approaching prior work may play a role in this problem. Concern about the impact of invalid work has been soothed by published commentaries assuring us science cleanses itself of invalid results.[19,20] There is little objective support for such opinions and, in fact, the little work done in the area supports opposite conclusions.[2] In addition, personal attributes of the users may promote this problem. Feinstein[21] has noted the inherent human frailties of scientists that affect their approaches to prior research. Specifically, he identifies "three natural human reactions: the urge to believe what we want to believe; an unwillingness to accept what is contrary to our beliefs; and an abhorrence of anything that suggests we have been wrong or done harm." Thus, it is possible that academicians in general may enter libraries looking more for support than for truth. This mindset could obviously lead to less scrutiny of prior studies.

In the face of these findings what recommendations can be made to limit the continued use of invalid science? We offer the following:

1. Medical school libraries should indicate their policies for handling inaccurate material and, likewise, users should make themselves well aware of these policies. The specific policy adopted may be less important than eliminating the false assumption by some users that libraries uniformly identify invalid work.

2. Currently, users alone are held responsible for determining a study's validity. Because inaccuracy is often not identified until years after publication,[2,22] clinicians, researchers, and educators should periodically review MEDLINE's citations of the studies they use, even those held in personal files for years. While this aspect of re-reviewing work previously accepted as valid may seem impractical, other accurate methods are not available at this time. The increasingly used CD-ROM technologies will also successfully identify retractions, comments, and errata, although there is some delay involved in awaiting the periodic disc updates for previous years.

3. Academic libraries choosing a hands-off policy regarding the integrity of their holdings should continue to work aggressively to educate users that only electronic searches will identify important retractions or corrections.

4. Given the inevitably expanding body of invalid results (caused by fraud or honest error), the broader question of how information should be removed from the scientific community needs to be addressed by organizations of bioscience, library science, and academia. Past emphasis has been placed only on how to get new information into scientists' hands.

Our study was designed to evaluate the effects of the articles' varying attributes on tagging rates. Regardless of retraction format, journal, or author prominence, issues of misconduct versus honest error, or any other attributes, the tagging rate for the articles was low (approximately 5–16%).

The bioscience community should be aware that medical school libraries hold articles that report invalid science. Likewise, libraries should note that many users do not routinely check the status of the studies they use and they may assume libraries integrate new information into their holdings. Because prior research is and will remain critical to new scientific literature, research proposals, and idea development, the handling of invalid research after its publication needs to be addressed. Error will no doubt remain inherent in all human endeavors. The individuals and institutions of science will be well served by efforts to limit readers' use of invalid study results and to promote self-correction of such results by the scientific community.

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Faculty Expectations and Primary Care Residents' Perceptions Concerning Residents' Growth in Competence at One Medical School

PATRICIA B. MULLAN, Ph.D., SUSAN G. BLITZ, M.D., M.P.H., and JEOFFREY K. STROSS, M.D.

Abstract—The authors studied at one school both the developing confidence of primary care residents and the expectations of both internal medicine and specialty faculty members regarding the abilities of the residents. From 1980 to 1988, residents in the study institution's program in internal medicine primary care completed self-assessments concerning their diagnostic and management skills in primary care and several specialties at the start of their training and at the ends of their first, second, and third years. In 1988, the authors elicited the expectations of the primary care and specialty faculties regarding the levels of competence that residents should achieve in the specialties by the end of their third year. When the faculty assessments were compared, the specialists were found to ascribe greater levels of autonomy to residents. The authors conclude that involving residents and faculty members from various disciplines in developing expectations and evaluation criteria can enhance faculty members' perceptions of residents' clinical competence and residents' achievement of it. *Acad. Med.* 67(1992):113–117.

Objectives for primary care training programs emphasize the need for educational environments that provide opportunities to diagnose and treat patients comprehensively.[1–3] But policy analysts[4] caution that primary care medicine should not be construed as equivalent to the medical specialties from which it draws. If faculty members hold discordant expectations for the competence primary care housestaff need, their training and evaluation of the housestaff might be constrained. Diverse studies note raters' implicit assumptions affect their assessments of trainees' competence. One recent study[5] cited the unintentional bias that faculty members invested in their programs' credibility as the factor "most likely" to be responsible for discrepancies between their ratings of trainees and the trainees' scores on the American Board of Internal Medicine certifying examination. In another study,[6] interpretations of surgery housestaff's mistakes—as either expected technical errors or unacceptable failures to discharge obligations conscientiously—depended on how strongly the faculty members believed that the housestaff engaged in critical self-

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Scholarly Productivity of Geriatrics Senior Faculty Members and Faculty Trainees Compared with That of Other Health Professions Educators

ROBERT E. ROUSH, Ed.D., M.P.H., CARL E. FASSER, P.A.-C., TERESA L. WRIGHT, and NANCY L. WILSON, M.A.

Abstract—To compare the scholarly productivity levels of senior geriatrics educators and faculty trainees, and to compare their productivity with those of other faculty groups, the authors analyzed questionnaires completed in 1988 by 97 senior staff members of geriatrics education centers nationwide and in 1985–1989 by 91 faculty enrollees in the year-long professional development program of the Texas Consortium of Geriatric Education Centers. The chief difference between the two groups was that more senior educators (75%) than enrollees (40%) had published in the three years previous to completing the questionnaire. The authors conclude that the productivity levels of the two groups compare favorably with previously reported productivity levels of health sciences faculties in general. *Acad. Med.* 67(1991):118–120.

With our burgeoning older population growing from the present 12.7% to 20% by the year 2025 (when today's students will still be practicing), the need for more faculty development in geriatrics is self-evident. To address this issue, the Texas Consortium of Geriatric Education Centers (TCGEC) has, since 1985, been involved with the national network of 31 currently funded centers that focus on the continued professional development in gerontology and geriatrics of health professions faculty.[1] Of the 8,456 persons who had attended TCGEC-sponsored programs to date, 251 were "faculty enrollees," representing 15 disciplines. These faculty enrollees participated in a year-long professional development program (PDP) consisting of (1) reading an eight-unit learning module focusing on the effects of normal aging, early and appropriate identification of problems encountered by older persons, improved interdisciplinary interactions among members of the health care team, and instructional strategies and resources for teaching geriatrics; (2) taking a 40-hour, content-intensive institute on the biological, sociologic, and psychological changes associated with age; and (3) completing a capstone experience for the balance of the academic year by developing a personal action plan to incorporate into their respective curricula what they learned in the institute. The TCGEC evaluation plan measured both the immediate impact of the PDP on enrollees and their scholarly productivity.

Based on the premise that only the most qualified, productive scholars in our universities can influence future caregivers to conduct elegant research leading to improved health care and services for all persons, we sought answers to the following questions: Were there significant differences between the scholarly productivity levels of faculty enrollees in a geriatrics PDP sponsored by the TCGEC and a national convenience group of academic gerontologists and geriatricians? How did either group's or both groups' scholarly productivity compare with the publication levels of other faculty groups reported in the literature?

Background

Regarding faculty socialization within academe, research findings have shown that productivity is predicted less by place of preparation, ability, workload, or prior places of work than by one's current environment; thus, those factors that do correlate highly with productivity can be affected by administrators through faculty selection, time allocation, assignments, rewards, and climate.[2] Findings of literature reviews on the scholarly productivity of selected groups of academicians are these: (1) *the professoriate-at-large*—results of two large-scale studies[3] revealed that, irrespective of rank, only 38% of America's college professors had published

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more than five articles; (2) *medicine* —an Institute of Medicine study[4] of former National Institutes of Health fellows revealed median ten-year publication records of 14 for M.D.s and 9 for Ph.D.s, whereas results[5] of a study of 309 graduates of The Robert Wood Johnson Foundation Clinical Scholars Program showed that 76.5% had published an average of 11.93 articles in their five-year posttraining period; (3) *nursing* — a survey[6] of 173 doctoral-level nursing faculty members in research universities showed they had a mean of seven total publications over their 15-year period of experience; (4) *allied health* — for the several professional fields constituting this group, studies[7] showed a .30-to-.70 range of mean annual publications, during ten years of experience; (5) *gerontology/geriatrics* — in the only published study known to us, Peterson and colleagues,[8] on behalf of the Association for Gerontology in Higher Education, found that the 438 educators responding averaged 13 years of experience and that the medical center faculty had published far more (mean = 16) than had their counterparts in universities (mean = 9.6) and colleges (mean = 5.4).

Method

A 36-item instrument was mailed to the 107 (faculty) enrollees participating in the TCGEC program from September 1985 to August 1989. Initial responses numbered 77; a follow-up mailing to nonrespondents resulted in 14 additional ones. Given the 85% ($n = 91$) response rate and the absence of differences between early and late responders, it was deemed not necessary to determine whether any response bias existed. (Wave analysis assumes that late respondents are similar to nonrespondents.[9]) The scholarly productivity of the enrollees was compared with that of 97 (88%) of the senior faculty or principal investigators and various members of their project staffs who responded to a similar questionnaire administered during a 1988 meeting held in Houston for key staff of geriatrics education centers (GECs). The data were analyzed using commands for frequencies, descriptives, and crosstabs on a standard computer program for statistical analysis in the social sciences.

Table 1

Summary Data on Differences between Senior Geriatrics Faculty and Faculty Trainees, 1985–1989*

Characteristics	Summary Data: Senior Staff Nationwide ($n = 97$)	Summary Data: Enrollees in Texas Program ($n = 91$)
Age (mean)	44.6 years	43.0 years
Gender		
Male	47.4%	34.1%
Female	52.6%	65.9%
Highest degree		
Doctorate	75.5%	56.0%
Master's	23.2%	26.4%
Baccalaureate	1.1%	17.6%
Tenured	61.1%	31.9%
Experience		
Mean (SD)	15.6 (9.5) years	16.2 (9.4) years
Range	1–42 years	1–48 years
Total publications over three-year period		
Per person† mean (SD)	7.7 (8.6)	4.2 (11.6)
Per published scholar only‡		
Mean (SD)	9.1 (8.6)	13.8 (18.9)
Range	1–37	2–70

*As part of their study comparing the scholarly productivity levels of geriatrics faculty with those of other health sciences educators, the authors compared biographical, experiential, and scholarly data for two groups of geriatrics educators. One group, responding to a questionnaire in 1988, consisted of members of the senior staffs of geriatrics education centers (GECs) nationwide; the other group, responding to a similar questionnaire from 1985 to 1989, consisted of enrollees in the year-long professional development program of the Texas Consortium of Geriatric Education Centers (TCGEC).

†Statistical comparison between the means of the two groups yielded the following result: $t = 2.11$, $p < .05$.

‡Of the senior educators, 73 (75%) published; of the faculty enrollees, 36 (40%) published; comparison between these percentages yielded a result of $t = 3.50$, $p < .01$.

Results

The GEC educators, presumably more senior than their somewhat less experienced TCGEC counterparts then being socialized into geriatrics-at-large, consisted of educators from the same eight health fields as the TCGEC enrollees. The proportions of enrollees in these fields were as follows: (1) allied health, 28%; (2) dentistry, 2%; (3) education or other, 23%; (4) medicine, 14%; (5) nursing, 18%; (6) public health, 1%; (7) psychology, 6%; and (8) social work, 7%. The principal differences between the proportions of the enrollees and the senior educators were that, for the senior educators, there were more allied health professionals, at 39%, more physicians, at 19%, fewer nurses, at 8%, and fewer project staff in education or other fields, at 9%. The variations among the proportions in these fields should be taken into account in interpreting the aggregate scholarly productivity data reported.

Summarized in Table 1 are some of

the data on the independent and dependent measures pertaining to the senior educators and enrollees. The senior educators' mean age was 44.6 years; they averaged 15.6 years of experience; 25% had not published a paper in the three years previous to the survey, while those who had published averaged 3.69 papers, 2.33 abstracts, and 1.7 books or chapters, resulting in an annual productivity index of 2.57 for all 97 senior educators. In addition, the senior educators, on the average, had been the coinvestigator or principal investigator of 1.5 funded grants during the previous three years.

The independent and dependent measures of the TCGEC enrollees were as follows: (1) their mean age was 43 years; (2) 66% were women; (3) 87.7% were Caucasian, 3.3%, Black, 6.6%, Hispanic, and 2.2%, Oriental; (4) 56% held doctorates, 26.4%, master's degrees, and 17.6%, baccalaureate degrees; (5) 62.6% had no formal graduate training in gerontology; (6) 83% held faculty appointments, with instructors constituting 16.4%, assistant professors, 41%, associate professors, 24%, and full professors, 15%; and (7) their three-year publication means were 2.65 articles, 1.09 abstracts, and .52 books or chapters in books, totalling 4.26 publications in three years, or 1.42 per year per enrollee. Over the two years following their completion of the TCGEC PDP, the enrollees had produced a posttraining publications mean of 3.77, for an annual productivity rate of 1.89. During the three years previous to their training, 36% of the enrollees had written a total of 98 grant applications, for an annual mean of .99 per grant writer. In the two-year period following their completion of the TCGEC PDP, 42% of the enrollees had written 84 applications for grants, for an annual mean of 1.11 per grant writer.

As regards the dependent measure of scholarly productivity, 75% of the senior educators and 40% of the enrollees had published. On a test of significance between the two percentages, the t of 3.5 produced $p < .01$. The difference between the mean rates of annual total publications of 2.57 for the senior educators and 1.42 for the enrollees was also significant, at $t = 2.11$, $p < .05$.

Discussion

On the primary measure of scholarly productivity, publications, both groups studied were clearly superior to the professiorate-at-large. Also, both groups appeared to be fairly productive compared with other groups dominated by M.D. and/or Ph.D faculty in the health sciences. This comparison is all the more favorable in light of the relatively new position of geriatrics in academic health centers and the highly interdisciplinary nature of the field.

For all geriatrics faculty, but especially for younger ones, it is important for the planners of faculty development programs to systematically foster scholarly productivity. Therefore, they should be aware of the characteristics of productive researchers, as summarized by Bland and Schmitz[10]: productive faculty members have (1) acquired an in-depth knowledge in a research area; (2) mastered methodologic skills; (3) adopted mores and expectations of researchers in their fields, e.g., Ph.D.s are socialized by the writing of their dissertations, whereas M.D.s are socialized to academic medicine during their postresidency fellowships; (4) associated and collaborated early in their careers with distinguished faculty mentors; (5) developed scholarly habits early, since publishing in the first five to ten years is highly predictive of future output; (6) maintained professional contacts and networked with other productive persons; (7) chosen productive departmental peers with whom to share projects and brainstorm ideas; (8) engaged in multiple projects, so if one doesn't work, perhaps another will; (9) scheduled research work for at least 20% of their time; (10) become institutionally oriented by serving on governance and curriculum committees; (11) been motivated by such work factors as creativity, problem solving, and flexibility; and (12) chosen places of work that support the scholarly interest of the faculty, as evidenced by the allocation of sufficient time, provision of assistance, and an atmosphere of academic freedom.

The need to foster faculty productivity in all fields is self-evident; the need to do so in geriatrics is imperative. As he demands for geriatric health care increase, these must be met by a cadre of caregivers educated and guided by appropriately trained faculty who compete academically in the same arenas as well as do other health professions educators.

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